

### **REMARKS**

Claims 1 and 7-9 are presently pending in the application.

Claim 1 has been amended to recite that the lower limit on the amount of component (C) is 0.15 percent by mass, which is supported in the specification at least at page 25, lines 19-21. No new matter has been added by this amendment, and entry is respectfully requested.

### **The Presently Claimed Invention**

The presently claimed invention is directed to providing a lubricating oil composition for an internal combustion engine having excellent anti-wear properties, long drain properties, detergency at high temperature, and low friction characteristics. The advantageous effects achieved by including an amount of salicylate detergent in an amount of 0.15 to 1 percent by mass in terms of metal, combined with a metal ratio of 1.5 or less, are demonstrated in Inventive Examples 5-9 as set forth in Table 2 of the present application. The Table below shows that the composition of Inventive Example 5 is superior at least in the LFW-1 boundary friction test relative to the compositions of Inventive Examples 6-9 (comparative examples), which do not meet at least one of the claimed conditions. Specifically, the slipping velocity average value of the composition of Inventive Example 5 (0.105) is significantly lower than any one of the values of Inventive Examples 6-9 (0.114 to 0.125).

**Properties of Inventive and Comparative Compositions**

<b>Claim 1</b>	<b>Inventive</b>	<b>Comparative</b>			
<b>Property of Component (C)</b>	<b>Ex. 5</b>	<b>Ex. 6</b>	<b>Ex. 7</b>	<b>Ex. 8</b>	<b>Ex. 9</b>
<b>(1) salicylate content with metal ratio <math>\leq 1.5</math>: 0.5-1 mass %</b>	0.26	0.13*	0.13*	0.26	0.26
<b>Total Salicylate Content (mass %)</b>	0.26	0.26	0.26	0.26	0.26
<b>(2) metal ratio <math>\leq 1.5</math></b>	1.0	1.0	1.0	1.8*	2.7*
<b>Sulfur content of composition <math>\leq 0.05</math> (mass %)</b>	0.05	0.05	0.07*	0.05	0.05
<b>LFW-1 Boundary Friction Coefficient</b>	<b>0.105</b>	<b>0.114</b>	<b>0.116</b>	<b>0.118</b>	<b>0.125</b>

\* Does not meet claimed condition

Rejection Under § 103(a) Based on EP '112

In the Office Action, the Examiner has rejected claims 1 and 7-9 under 35 U.S.C. § 103(a) as being unpatentable over EP 0 889 112 ("EP '112"). The Examiner argues that EP '112 teaches a lubricating oil composition for an automatic transmission comprising a major amount of a base oil and, as additives: (a) 0.02 to 4% by weight of a succinimide compound of formula (I), (b) 0.02 to 5% by weight of at least one metal salt (preferably an alkaline earth metal salt) of an organic acid selected from the group consisting of sulfonates, phenates, salicylates, and phosphonates, and (c) 0.01 to 5% by weight of at least one compound selected from phosphate esters, phosphite esters, and acid phosphite esters. The Examiner argues that EP '112 allows for the addition of conventional additives to the composition, including amine-type and phenol-type antioxidants, but does not require the addition of zinc dialkyldithiophosphate. The Examiner thus concludes that the lubricant compositions of EP '112 meet the claimed limitations. The Examiner notes that although a total sulfur content of the composition of 0.05% by mass (500 ppm) by mass or less is not set forth, sulfur-containing components are not required to be present in the prior art composition. Applicants respectfully traverse this rejection as follows.

EP '112 is directed to providing a composition for automatic transmissions which has excellent anti-shudder properties and a high transmission torque capacity. EP '112 teaches that in lock-up clutches in a continuously slipping torque converter, shudder is easily generated when there is a reduction in friction coefficient accompanying an increase in slipping velocity. Accordingly, EP '112 is directed at finding an optimal static friction coefficient that will maintain a high transmission torque capacity while preventing the occurrence of shudder. EP '112 thus provides a composition with excellent anti-shudder properties while maintaining the static friction coefficient of the composition at a high level of 0.100 or more by using specific imide compounds represented by formula (I) as friction modifiers. Such compositions are completely different from the presently claimed invention, which is directed at a composition having as low a friction coefficient as possible.

EP '112 does not teach or suggest the properties of the claimed metal salicylate detergent component (C), and thus one skilled in the art would not have expected the advantageous effects achieved from these properties based on EP '112. Specifically, although EP '112 teaches metal salicylates at page 7, lines 18-32, EP '112 is silent as to the claimed metal ratio of 1.5 or less. As

shown in the Table above, the compositions of Ex. 5 (inventive) and Ex. 6 (comparative) have the same metal ratio (1.0), total sulfur content (0.05 mass %), and total salicylate content (0.26 mass %), and differ only in the content of salicylate having a metal ratio of  $\leq 1.5$  (0.26 mass % for Ex. 5, 0.13 mass % for Ex. 6). Thus, although the composition of comparative Ex. 6 has a total salicylate content of 0.26 mass %, the composition contains only 0.13 mass % of salicylates having the claimed metal ratio, a value which is outside of the claimed range of 0.15 to 1 mass %. As shown in the Table, the comparative composition exhibited a inferior LFW-1 Boundary Friction Coefficient value (0.114 vs. 0.0105) relative to the inventive composition. This dramatic difference in properties may only be attributed to the difference in content of metal salicylate having the claimed metal ratio as all of the other properties of the compositions of Ex. 5 and 6 are identical. These results demonstrate the criticality of the claimed metal ratio and salicylate content, and further than it is not the total salicylate content which is important, but rather the *content of salicylate having the claimed metal ratio*. Such results, which would not have been expected based on EP '112 (which is silent as to metal ratio and salicylate content as claimed), would overcome any case of *prima facie* obviousness which were to be established.

In sum, not only does EP '112 not teach or suggest all of the claimed elements, but the results exhibit by the presently claimed compositions would also not have been expected based on EP '112. The criticality of the claimed metal ratio combined with the amount of metal salicylate in the presently claimed composition has been demonstrated, and not would not have been expected based on EP '112. Accordingly, reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

*Rejection Under § 103(a) Based on Nakazato in view of Minami or Nishikawa*

In the Office Action, the Examiner has again rejected claims 1 and 7-9 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,569,818 of Nakazato ("Nakazato") in combination with U.S. Patent No. 5,792,733 of Minami et al. ("Minami") or U.S. Patent No. 5,245,070 of Nishikawa et al. ("Nishikawa"). Briefly, the Examiner again argues that Nakazato teaches a lubricating oil composition having specific phosphorus, sulfur, and sulfated ash contents which comprises: (a) a major amount of a specific mineral base oil having a low sulfur content, (b) an ashless alkenyl or alkyl-succinimide dispersant or derivative thereof, and (c) a metal-containing detergent, such as an alkali metal or an alkaline earth metal salt of an

alkylsalicylic acid. The composition may allegedly include other metal detergents, such as sulfonate detergents, (d) a zinc dialkyl-dithiophosphate in an amount of 0.01 to 0.1 weight % in terms of phosphorus content, and (e) an oxidation inhibitor which may be a phenol compound or an amine compound.

The Examiner further argues that Nakazato teaches that the lubricating oil compositions may contain other auxiliary additives, such as phosphoric acid esters and phosphorous acid esters. The Examiner acknowledges that Nakazato does not teach or suggest the claimed specific phosphorus acid ester compound, a triphosphate of formula (1). However, the Examiner argues that such triphosphate compounds are well known in the art as antiwear agents in lubricating oil compositions, as evidenced by Minami or Nishikawa. The Examiner thus concludes that it would have been obvious to one having ordinary skill in the art at the time of the invention to have added the triphosphate compound of Minami or Nishikawa to the oil composition of Nakazato if its known imparted properties were so desired. Applicants again respectfully traverse this rejection and the arguments set forth for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons that follow.

As previously explained on the record, Nakazato teaches a lubricating oil composition having specific phosphorus, sulfur, and sulfated ash contents and containing: (a) a mineral base oil, (b) an ashless alkenyl or alkyl-succinimide dispersant, (c) a metal-containing detergent, (d) ZnDTP in an amount of 0.01 to 0.1 wt % in terms of phosphorus content, and (e) an oxidation inhibitor.

Initially, Applicants respectfully submit that the Examiner has not established where Nakazato teaches or suggests a salicylate detergent having a metal ratio of 1.5 or less as claimed, and even the proposed combination with Minami or Nishikawa would not cure such a deficiency with Nakazato. Nakazato describes the metal-containing component at col. 4, line 58 to col. 5, line 26, but is silent as to the claimed metal ratio or any metal ratio at all. Further, although Nakazato teaches that the detergent is used in the composition in an amount of 0.1 to 1 wt% in terms of sulfated ash content, Nakazato does not teach or suggest the claimed amount of 0.15 to 1 mass % of metal salicylate *having the claimed metal ratio*. Accordingly, because Nakazato does not teach or suggest the claimed metal ratio or amount of metal salicylate, the advantageous results exhibited by the presently claimed compositions, demonstrated above, would not have been expected based on Nakazato.

In response to Applicants' previous arguments, the Examiner maintains that the observed 15% increase in slipping velocity is due to the presence of a high amount of sulfur in the Comparative Example, which is not required to be present in the Nakazato compositions, and further that although the composition of Inventive Example 1 exhibits better base number retaining properties than the composition of Inventive Example 2, these results are directly due to using a specific ZnDTP compound having a very high sulfur content of 16 mass %. To the contrary, as set forth in the Table above, the compositions of Inventive Example 5 and Inventive Examples 6-9 (comparative) contain no ZnDTP or a very slight amount thereof, such that the sulfur contents in these compositions is only 0.05 to 0.07 mass %. Accordingly, the observed results cannot be attributed to sulfur amounts or to the influence of ZnDTP. Rather, these results can only be attributed to the properties of component (C), namely, the metal ratio and metal salicylate content.

Finally, the Examiner maintains that zinc dialkyldithiophosphates are well known lubricating oil additives which are effective as antioxidants and as extreme pressure/antiwear agents, and that Nakazato teaches the addition of such conventional additives in very minor amounts of 0.01 weight %. Accordingly, the Examiner maintains that it would have been obvious to a skilled oil formulator to have omitted the conventional ZnDTP from the Nakazato composition if the function attributed to this component was not desired. Applicants again respectfully traverse this argument.

Nakazato is directed to a composition that does not disturb functions of particulate traps and oxidizing catalysts and/or NO<sub>x</sub> reducing catalysts, while providing stability at high temperatures so that it can meet the anticipated exhaust gas regulations (col. 2, lines 26-32). Nakazato clearly teaches at col. 3, lines 38-46 that:

It is well known to those skilled in the art that decreases of the sulfur content, phosphorus content, and sulfated ash content in the lubricating oil composition result in lowering of high temperature stability of the lubricating oil composition. It has now been discovered that the lowering of the high temperature stability of the lubricating oil composition by the decreases of the sulfur content, phosphorus content, and sulfated ash content can be compensated using a small amount of a metal-containing detergent having a certain amount of soap content, namely, a content of an organic acid metal salt component is contained, in combination with an ashless dispersant, zinc dialkyldithiophosphate, and an oxidation inhibitor. (emphasis added)

Nakazato clearly teaches the importance of including in the composition a combination of ZnDTP, a metal-containing detergent, ashless dispersant, and oxidation inhibitor in order to avoid the reduction of high temperature stability while decreasing sulfur, phosphorus, and ash contents. Nakazato does not teach that any of these components may be eliminated and still provide the same results. Accordingly, one skilled in the art would learn from Nakazato that removing ZnDTP would negatively affect the Nakazato composition (particularly the high temperature stability), and the Examiner has not provided a motivation, either in the secondary references or otherwise, for removing ZnDTP from the Nakazato composition. Accordingly, Applicants still cannot conceive of why, based on Nakazato, one skilled in the art would have been motivated to eliminate an essential component of a composition. The Examiner has further **not** addressed Applicants' previous arguments.

As previously explained on the record, Nakazato teaches that the ZnDTP compound preferably contains an alkyl or alkylaryl group having 3 to 18 carbon atoms. Particularly preferred are alkyl groups derived from a secondary alcohol or a mixture of secondary and primary alcohols, since the latter are taught to provide high heat resistance (col. 6, lines 30-37). Applicants respectfully cannot understand why one skilled in the art would have been motivated based on Nakazato to omit a component which is taught to be essential and which is taught to provide desirable high heat resistance. If such a component were intended to be optional, it would have been included by Nakazato in the list of *optional* auxiliary additives described at col. 7, line 59 to col. 8, line 11. Applicants do not agree that one would have been motivated to eliminate ZnDTP from the lubricating oil composition in order to eliminate high heat resistance (high temperature detergency) of the composition.

The Examiner cites MPEP § 2144.04 as teaching that "omission of an element and its function is obvious if the function of the element is not desired." The MPEP describes the case cited by the Examiner (*Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989)):

The claims at issue were directed to a method for inhibiting corrosion on metal surfaces using a composition consisting of epoxy resin, petroleum sulfonate, and hydrocarbon diluent. The claims were rejected over a primary reference which disclosed an anticorrosion composition of epoxy resin, hydrocarbon diluent, and polybasic acid salts wherein said salts were taught to be beneficial when employed in a freshwater environment, in view of secondary references which clearly suggested the addition of petroleum sulfonate to corrosion inhibiting compositions. The Board affirmed the rejection, holding that it would have been

obvious to omit the polybasic acid salts of the primary reference where the function attributed to such salt is not desired or required, such as in compositions for providing corrosion resistance in environments which do not encounter fresh water.

In such a situation, if the composition was to be used in a *non-freshwater environment*, it would have been reasonable to omit from the corrosion-inhibiting composition the component which *provided corrosion resistance in freshwater*, since such a component would have been superfluous. The resulting composition would still be expected to provide the same corrosion resistance, albeit in a different environment.

Applicants respectfully submit that such a situation is completely different from the claimed case. In contrast with the case cited by the MPEP, the Examiner is arguing that one skilled in the art would have been motivated to omit ZnDTP from the Nakazato composition in order to provide a lubricating composition with inferior high temperature properties. Nakazato teaches the lubricating oil compositions are useful in motor driven vehicles using low sulfur hydrocarbon fuels, particularly diesel engine-mounted vehicles (col. 3, lines 54-56), and that the compositions have stability at high temperature so that they can meet exhaust gas regulations (col. 2, lines 30-32). Accordingly, based on the teaching of Nakazato, the modified composition proposed by the Examiner would be an inferior composition which would not meet the objectives of Nakazato. The proposed composition would not simply be a composition that provided the same properties as the Nakazato composition but was for use in a different environment. Accordingly, Applicants again respectfully submit that there would have been no motivation to modify the Nakazato composition as proposed by the Examiner.

For at least these reasons, the presently claimed composition would not have been obvious based on Nakazato, and even modification of the Nakazato composition to include a triphosphate compound of Minami or Nishikawa would still yield a composition containing ZnDTP, since neither of the secondary references would provide a motivation for omitting ZnDTP from the Nakazato composition. The proposed combination would also not contain a metal salicylate having the claimed metal ratio in the claimed amount.

Accordingly, no *prima facie* case of obviousness has been established based on the proposed combination of references, and reconsideration and withdrawal of the § 103(a) rejection based on Nakazato in view of Minami or Nishikawa are respectfully requested.

In view of the preceding Amendments and Remarks, Applicants respectfully submit that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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